PATENT
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IN THE CLAIMS

1. (original) A pulse detonation system for a gas turbine engine having a longitudinal centerline axis extending therethrough, comprising:

(a) a rotatable cylindrical member having a forward surface, an aft surface, and an outer circumferential surface, said cylindrical member including at least one stage of circumferentially spaced detonation passages disposed therethrough, each said detonation passage further comprising:

(1) a leading portion positioned adjacent said forward surface of said cylindrical member, said leading portion having a centerline therethrough oriented at a designated angle to an axis extending substantially parallel to said longitudinal centerline axis within a specified plane;

(2) a trailing portion positioned adjacent said aft surface of said cylindrical member, said trailing portion having a centerline therethrough oriented at a designated angle to said axis within said specified plane; and,

(3) a middle portion connecting said leading and trailing portions, said middle portion having a centerline therethrough with a substantially constantly changing slope in said specified plane;

(b) a shaft rotatably connected to said cylindrical member; and,

(c) a stator configured in spaced arrangement with said forward surface of said cylindrical member and a portion of said shaft, said stator including at least one group of ports formed therein alignable with said leading portions of said detonation passages as said cylindrical member rotates;

wherein detonation cycles are performed in said detonation passages so that combustion gases interact therewith to create a torque which causes said cylindrical member to rotate.

2. (original) The pulse detonation system of claim 1, wherein said specified plane is oriented substantially parallel to a tangent of a circumference for said cylindrical member.

3. (original) The pulse detonation system of claim 1, wherein said designated angle of said centerline for said leading portion is in a range of approximately 0° to 75° to said axis.

4. (original) The pulse detonation system of claim 1, wherein said designated angle of said centerline for said trailing portion is in a range of approximately 0° to -75° to said axis.

5. (original) The pulse detonation system of claim 1, wherein said designated angle of said leading portion and said designated angle of said trailing portion have a substantially equal magnitude.

6. (original) The pulse detonation system of claim 1, wherein said designated angle of said leading portion and said designated angle of said trailing portion are oriented on opposite sides of said axis.

7. (original) The pulse detonation system of claim 1, wherein said specified plane is oriented so as to be at a first angle to a first plane extending substantially parallel to a tangent of a circumference for said cylindrical member and at a second angle to a second plane extending substantially radially through said cylindrical member.

8. (original) The pulse detonation system of claim 7, wherein said first angle is in a range of approximately 0° to 75°.

9. (original) The pulse detonation system of claim 7, wherein said second angle is in a range of approximately 0° to 45°.

10. (original) The pulse detonation system of claim 7, said designated angle of said centerline for said leading portion further comprising a first component in a range of approximately 0° to 75° with respect to said axis and a second component in a range of approximately 0° to 45° with respect to said axis.

11. (original) The pulse detonation system of claim 7, said designated angle of said centerline for said trailing portion further comprising a first component in a range of approximately 0° to –75° with respect to said axis and a second component in a range of approximately 0° to -45° with respect to said axis.

12. (original) The pulse detonation system of claim 1, wherein said port groups of said stator are oriented at a designated angle to said longitudinal centerline axis.

13. (original) The pulse detonation system of claim 12, wherein designated angle of said port groups is greater than said designated angle of said leading portion for said detonation passages.

14. (original) The pulse detonation system of claim 12, wherein said port groups are oriented at an angle to said longitudinal centerline axis in a range of approximately 45° to 85°.

15. (original) The pulse detonation system of claim 12, wherein a difference between said designated angle of said port groups and said designated angle of said leading portion is within a range of approximately 10° to 65°.

16. (original) The pulse detonation system of claim 1, further comprising at least one disk connecting said shaft and said rotatable cylindrical member.

17. (original) The pulse detonation system of claim 1, wherein said detonation passages of each detonation stage are symmetrically spaced within said cylindrical member.

18. (original) The pulse detonation system of claim 1, wherein said detonation passages are integral with said cylindrical member.

19. (original) The pulse detonation system of claim 1, wherein said detonation passages are formed in replaceable segments connected to said cylindrical member.

20. (original) The pulse detonation system of claim 1, further comprising a plurality of detonation stages in said cylindrical member.

21. (original) The pulse detonation system of claim 20, said detonation passages of each said detonation stage being arranged in a substantially annular configuration through said cylindrical member having a distinct radius.

22. (original) The pulse detonation system of claim 1, each said group of ports in said stator further comprising an air port in flow communication with a source of compressed air.

23. (original) The pulse detonation system of claim 1, each said group of ports in said stator further comprising a fuel port in flow communication with a fuel source.

24. (original) The pulse detonation system of claim 1, each said group of ports in said stator further comprising a port having a device for initiating a detonation wave associated therewith.

25. (original) The pulse detonation system of claim 1, further comprising a plurality of port groups provided in said stator, wherein a plurality of detonation cycles occur in a predetermined timing and sequence in each said detonation passage during a revolution of said cylindrical member.

26. (original) The pulse detonation system of claim 25, said stator including a predetermined amount of circumferential space between each said port group.

27. (original) The pulse detonation system of claim 1, further comprising a seal plate positioned between said stator and said forward surface of said cylindrical member.

28. (original) The pulse detonation system of claim 1, wherein a cross-sectional area through said detonation passages is substantially constant.

29. (original) The pulse detonation system of claim 1, wherein a cross-sectional area through said leading and trailing portions of said detonation passages is not substantially constant.

30. (cancelled)

31. (cancelled)

32. (cancelled)

33. (cancelled)

34. (cancelled)

35. (currently amended) A gas turbine engine having a longitudinal centerline axis extending therethrough, comprising:

(a) a fan section at a forward end of said gas turbine engine including at least a first fan blade row connected to a drive shaft;

(b) a booster compressor positioned downstream of said fan section, said booster compressor including a first compressor blade row and a second compressor blade row connected to said drive shaft and interdigitated with said first compressor blade row; and,

(c) a pulse detonation system for powering said drive shaft, said pulse detonation system further comprising:

(1) a rotatable cylindrical member having a forward surface, an aft surface, and an outer circumferential surface, said cylindrical member including at least one detonation stage having a plurality of spaced detonation passages disposed therethrough and being connected to said drive shaft, each said detonation passage further comprising:

(a) a leading portion positioned adjacent said forward surface of said cylindrical member, said leading portion having a centerline therethrough oriented at a designated angle to an axis extending substantially parallel to said engine longitudinal centerline axis within a specified plane;

(b) a trailing portion positioned adjacent said aft surface of said cylindrical member, said trailing portion having a centerline therethrough oriented at a designated angle to said axis within said specified plane; and,

(c) a middle portion connecting said leading and trailing portions, said middle portion having a centerline therethrough with a substantially constantly changing slope in said specified plane; and,

(2) a stator configured in spaced arrangement with said forward surface of said cylindrical member and a portion of said shaft, said stator including at least one group of ports formed therein alignable with said leading portion of said detonation passages as said

cylindrical member rotates;

wherein detonation cycles are performed in said detonation passages so that combustion gases interface therewith to create a torque which causes said cylindrical member to rotate and power said fan section and said booster compressor.

36. (currently amended) A gas turbine engine having a longitudinal centerline axis extending therethrough, comprising:

(a) a bellmouth at a forward end of said gas turbine engine;

(b) a compressor positioned downstream of and in flow communication with said bellmouth, said compressor including a first compressor blade row and a second blade row connected to a drive shaft and interdigitated with said first compressor blade row;

(c) a load connected to said drive shaft; and,

(d) a pulse detonation system for powering said drive shaft, said pulse detonation system further comprising:

(1) a rotatable cylindrical member having a forward surface, an aft surface, and an outer circumferential surface, said cylindrical member including at least one detonation stage having a plurality of detonation passages disposed therein and being connected to said drive shaft, each said detonation passage further comprising:

(a) a leading portion positioned adjacent said forward surface of said cylindrical member, said leading portion having a centerline therethrough oriented at a designated angle to an

axis extending substantially parallel to said engine longitudinal centerline axis within a specified plane;

(b) a trailing portion positioned adjacent said aft surface of said cylindrical member, said trailing portion having a centerline therethrough oriented at a designated angle to said axis within said specified plane; and,

(c) a middle portion connecting said leading and trailing portions, said middle portion having a centerline therethrough with a substantially constantly changing slope in said specified plane;

(2) a stator configured in spaced arrangement to said forward surface of said cylindrical member and a portion of said shaft, said stator including at least one group of ports formed therein alignable with said leading portion of said detonation passages as said cylindrical member rotates;

wherein detonation cycles are performed in said detonation passages so that combustion gases interface therewith to create a torque which causes said cylindrical member to rotate and power said compressor and said load.